

**REMARKS**

By this Amendment, Claim 36 has been canceled and Claim 37 has been added, leaving Claims 11, 14-19, 24-35 and 37 pending. New Claim 37 does not raise any new issue that would require further search and/or consideration by the Patent Office because it recites features of alternative clause (b) recited in Claim 11, from which it depends. Accordingly, entry of the amendments is respectfully requested. Reconsideration of the October 24, 2003, Official Action is respectfully requested.

**1. Rejections of Claim 36 Under 35 U.S.C. §112, ¶2 and §103**

Claim 36 stands rejected under 35 U.S.C. §112, ¶2, for the reasons stated at numbered paragraph (3) of the Official Action, and under 35 U.S.C. §103(a) over U.S. Patent No. 4,799,963 to Basil et al. for the reasons stated on page 4 of the Official Action. Claim 36 has been canceled, making the rejections moot.

**2. Rejection of Claims 11, 14-19 and 24-35 Under 35 U.S.C. §103**

Claims 11, 14-19 and 24-35 stand rejected under 35 U.S.C. §103(a) over JP 10004083 ("JP '083") in view of U.S. Patent No. 5,362,335 to Rungta and U.S. Patent No. 5,721,057 to Bamberg et al. ("Bamberg"). The reasons for the rejection are stated at numbered section 5, on pages 2-3 of the Official Action. The rejection is respectfully traversed.

Claim 11 recites "a component of semiconductor processing equipment, the component comprising an aluminum substrate and a ceramic layer of cerium oxide containing ceramic material on the substrate and forming an outermost surface of the component, wherein the cerium oxide containing ceramic material (a) consists essentially of one or more cerium oxides or (b) consists essentially of one or more cerium oxides as the single largest constituent thereof and an oxide of an element of the lanthanide series" (emphasis added). The cited combination of references fails to suggest the component recited in Claim 11 for the following reasons.

The Official Action asserts that JP '083 discloses a cerium oxide coating on the inside of a plasma chamber, clamp ring or shield ring, but acknowledges that JP '083 does not disclose that the parts have a cerium oxide layer disposed over aluminum. It is further asserted that JP '083 teaches the parts could be made of an oxide of ceramic.

The Official Action asserts that "Ravi Rungta discloses [a] corrosion-resistant barrier coating of cerium oxide on aluminum alloy and teaches that the corrosion resistance is superior to that of aluminum oxide ...."

The Official Action asserts that Bamberg discloses the coating of metal parts exposed to high temperature and gases with cerium oxide containing coatings.

The Official Action also asserts that plasma chambers and other parts used in semiconductor manufacturing are frequently made of aluminum or aluminum oxide and may also have an anodized coating for corrosion resistance. The Official Action alleges that it would have been obvious to have a cerium oxide coating on the inside of the chamber or other process chamber parts for better corrosion resistance. Applicants respectfully disagree with these assertions.

JP '083 discloses an anticorrosive material for semiconductor fabrication, and that a part of a product "is made from a compd. thin film or single crystal," where the compound is an oxide, nitride, carbide or fluoride of 3a elements of the periodic table, e.g. Sc, La, Ce, Eu and Dy.

Rungta discloses a method of applying a coating on an aluminum alloy, which method comprises incorporating a cerium oxide coating material into an aluminum oxide film by a chemical reaction process. The coating formed on the metal structural part by the chemical reaction process is a mixed barrier layer containing both aluminum oxide in a substantial amount and the incorporated cerium oxide. The cerium oxide is not the single largest constituent of the mixed layer. Rungta fails to suggest forming a ceramic layer of cerium oxide containing ceramic material on an aluminum substrate, where the ceramic layer forms an outermost layer of the component, and "the cerium oxide containing ceramic

material (a) consists essentially of one or more cerium oxides or (b) consists essentially of one or more cerium oxides as the single largest constituent thereof and an oxide of an element of the lanthanide series" (emphasis added). Accordingly, Rungta does not suggest modifying the JP '083 component to include an aluminum substrate and the ceramic layer recited in Claim 11 on the aluminum substrate.

Bamberg fails to cure the deficiencies of JP '083. Bamberg discloses a ceramic heat insulation layer on a metal structural part. In a preferred embodiment, a passivating ceramic material (stabilized zirconium oxide or cerium oxide) is deposited into microcracks in the heat insulation layer (column 1, line 62 - column 2, line 8). The resulting heat insulation layer is a mixed barrier layer containing both the heat insulation layer material (e.g., zirconium dioxide; see column 2, lines 38-39) and cerium oxide. Clearly, Bamberg does not suggest that the heat insulation layer may consist essentially of cerium oxide, or that cerium oxide may be the single largest constituent of the heat insulation layer. Bamberg does not suggest modifying JP '083 to include a ceramic layer of cerium oxide containing ceramic material on an aluminum substrate, where the ceramic layer forms an outermost layer of the component, and where "the cerium oxide containing ceramic material (a) consists essentially of one or more cerium oxides," as recited in Claim 11.

The cited references also fail to suggest the feature recited in clause (b) of Claim 11 that "the cerium oxide containing ceramic material ... (b) consists essentially of one or more cerium oxides as the single largest constituent thereof and an oxide of an element of the lanthanide series" (emphasis added). JP '083 discloses that the anticorrosive material may be, as one possible composition, an oxide of 3a elements of the Periodic Table, but does not suggest that the material may consist essentially of one or more cerium oxides as the single largest constituent thereof and also an oxide of an element of the lanthanide series. Rungta and Bamberg also fail to suggest such a cerium oxide containing ceramic material.

Thus, it is respectfully submitted that the combination of JP '083, Rungta and Bamberg fails to suggest the combination of features recited in Claim 11, which therefore is patentable.

Claims 14-16, 19 and 24 depend from Claim 11 and, accordingly, also are patentable over the cited references for at least the same reasons that Claim 11 is patentable. Moreover, these dependent claims recite additional features that further patentably distinguish the claimed subject matter over the cited references. For example, Claim 14 recites that "the aluminum substrate has an anodized surface and the ceramic layer is disposed on the anodized surface." In contrast, Rungta discloses incorporating cerium oxide into and not on an aluminum oxide film.

Independent Claim 17 recites "a component of semiconductor processing equipment ... comprising a bulk part consisting essentially of a cerium oxide containing ceramic material, ... and the cerium oxide containing ceramic material comprising one or more cerium oxides as the single largest constituent thereof" (emphasis added). The cited references fail to suggest the component recited in Claim 17.

JP '083 fails to disclose or suggest a bulk part consisting essentially of a cerium oxide containing ceramic material, as recited in Claim 17. JP '083 discloses the formation of CeO<sub>2</sub> by PVD (physical vapor deposition) in Examples 22 and 23 at page 4. During PVD processes, material is deposited onto a substrate. Also, JP '083 discloses that "a part of a product" (emphasis added) is made from a thin film or single crystal, where the product can be, e.g., a Si wafer clamp ring. That is, the entire product is not made of the thin film or single crystal material. Thus, JP '083 does not suggest forming a bulk part consisting essentially of cerium oxide.

Both Rungta and Bamberg disclose forming coating layers over substrates that are made of different materials than the coatings. Neither Rungta nor Bamberg suggests forming a bulk part consisting essentially of a cerium oxide containing ceramic material, as recited in Claim 17, much less a component of semiconductor processing equipment. Thus,

Rungta and Bamberg provide no motivation to modify JP '083 to achieve the component of semiconductor processing equipment recited in Claim 17, which therefore is patentable.

Claims 25 and 26 depend from Claim 17 and, accordingly, also are patentable for at least the same reasons that Claim 17 is patentable.

Independent Claim 18 recites a component of semiconductor processing equipment, which comprises "a cerium oxide containing ceramic material forming an outermost surface of the component ... and the cerium oxide containing ceramic material comprising one or more cerium oxides as the single largest constituent thereof, wherein (a) the component is a bulk part consisting essentially of the cerium oxide containing ceramic material or (b) the cerium oxide containing ceramic material comprises a ceramic layer on a ceramic substrate" (emphasis added). With regard to clause (a) of Claim 18, the combination of JP '083, Rungta and Bamberg fails to suggest a component of semiconductor processing equipment, comprising "a cerium oxide containing ceramic material forming an outermost surface of the component," where "the component is a bulk part consisting essentially of the cerium oxide containing ceramic material" (emphasis added), as recited in Claim 18 (Claim 33 depends from Claim 18 and requires that "the component is the bulk part.")

With regard to clause (b) of Claim 18, the combination of JP '083, Rungta and Bamberg fails to suggest a component of semiconductor processing equipment, which comprises "a cerium oxide containing ceramic material forming an outermost surface of the component, ... and the cerium oxide containing ceramic material comprising one or more cerium oxides as the single largest constituent thereof, wherein ... (b) the cerium oxide containing ceramic material comprises a ceramic layer on a ceramic substrate" (emphasis added). JP '083 does not disclose forming a "cerium oxide containing ceramic material comprising one or more cerium oxides as the single largest constituent thereof," where "the cerium oxide containing ceramic material comprises a ceramic layer on a ceramic substrate" (emphasis added), as recited in Claim 18. Neither Rungta nor Bamberg suggests a "cerium oxide containing ceramic material comprising one or more cerium oxides as the single

largest constituent thereof," as recited in Claim 18. Accordingly, the combination of features recited in Claim 18 also is patentable over the cited references.

Claims 27-35 depend from Claim 18 and, accordingly, also are patentable for at least the same reasons that Claim 18 is patentable.

Withdrawal of the rejection is therefore respectfully requested.

**3. Rejection of Claims 11, 14, 16-19, 24-29 and 31-35 Under 35 U.S.C. §103**

Claims 11-19 stand rejected under 35 U.S.C. §103(a) over U.S. Patent No. 6,447,636 to Qian et al. ("Qian") in view of U.S. Patent No. 6,123,791 to Han et al. ("Han") and JP '083. The reasons for the rejection are stated at numbered section 6, on pages 3-4 of the Official Action. The rejection is respectfully traversed.

The Official Action asserts that "Qian et al disclose parts of a plasma process chamber for semiconductor manufacturing made of aluminum or ceramic like aluminum oxide combined with an oxide of Group IIIB metal like cerium." It is acknowledged in the Official Action that Qian does not disclose the relative proportions of aluminum oxide to Group III element oxide. The Official Action further asserts that Han discloses "a process kit for semiconductor manufacturing ... having a composition of aluminum oxide ceramic and Group III oxide and disclose that the proportion could be 70% ...." Applicants respectfully submit that the cited references also fail to suggest the combinations of features recited in Claims 11-19.

Qian discloses a plasma reactor including a dome or top 103, which "is mainly a ceramic component that is typically electrically insulating" (emphasis added; see FIG. 1 and col. 6, lines 5-53). Qian does not suggest that the top 103 could include an aluminum substrate, as recited in Claim 11. Rather, Qian discloses that the top 103 is mainly a ceramic component. Also, Qian discloses that the top is typically electrically insulating. In contrast, aluminum is electrically conductive. Accordingly, Qian teaches away from

somehow modifying the ceramic, electrically insulative top 103 to include an aluminum substrate, as recited in Claim 11.

Han and JP '083 fail to cure the deficiencies of Qian regarding the component recited in Claim 11. Han discloses ceramic compositions for a process kit and a dielectric window of a reactor chamber. Han discloses that the compositions include a ceramic compound and an oxide of a Group IIIB metal, but does not suggest that the ceramic compound is a ceramic layer on a substrate.

In contrast to Qian and Han, JP '083 discloses forming coatings of certain compounds of 3a elements, and not bulk parts.

Regarding the component recited in Claim 11, Han and JP '083 fail to provide any motivation to modify the bulk top 103 disclosed in Qian to produce a component comprising an aluminum substrate and a ceramic layer of cerium oxide containing ceramic material on the aluminum substrate, which Qian clearly teaches away from.

Also, Han discloses bulk parts of ceramic compositions. JP '083 fails to suggest forming a cerium oxide containing ceramic material on an aluminum substrate. Accordingly, even if the teachings of Qian, Han and JP '083 were combined despite there being no motivation to do so, the combined teachings still would not include the combination of features recited in Claim 11, which includes a ceramic layer of a cerium oxide containing ceramic material, which "(a) consists essentially of one or more cerium oxides."

The cited references also do not suggest a ceramic oxide containing material that "(b) consists essentially of one or more cerium oxides as the single largest constituent thereof and an oxide of an element of the lanthanide series" (emphasis added), as recited in Claim 11. The combination of Qian, Han and JP '083 fails to suggest such ceramic oxide containing material that includes such combination of oxides as recited in clause (b) of Claim 11.

Dependent Claims 14-16, and 19 also are patentable over the cited combination of references for at least the same reasons that Claim 11 is patentable.

Regarding Claim 17, Qian, Han and JP '083 fail to disclose or suggest "a component of semiconductor processing equipment ... comprising a bulk part consisting essentially of a cerium oxide containing ceramic material, ... the cerium oxide containing ceramic material comprising one or more cerium oxides as the single largest constituent thereof" (emphasis added). Qian and Han do not suggest that the bulk parts comprise one or more cerium oxides as their single largest constituent, while JP '083 does not disclose forming bulk parts. Accordingly, Claim 17 also is patentable over the cited references.

Regarding Claim 18, Qian, Han and JP '083 fail to disclose or suggest "a component of semiconductor processing equipment ... comprising a cerium oxide containing ceramic material forming an outermost surface of the component, ... the cerium oxide containing ceramic material comprising one or more cerium oxides as the single largest constituent thereof, wherein (a) the component is a bulk part consisting essentially of the cerium oxide containing ceramic material or (b) the cerium oxide containing ceramic material comprises a ceramic layer on a ceramic substrate" (emphasis added). Accordingly, Claim 18 also is patentable over Qian, Han and JP '083.

Withdrawal of the rejection is therefore respectfully requested.

#### **4. New Claim**

New Claim 37 depends from Claim 11 and recites that "the cerium oxide containing ceramic material consists essentially of one or more cerium oxides as the single largest constituent thereof and an oxide of an element of the lanthanide series." Claim 37 also is patentable for reasons stated above.



5. **Conclusion**

For the foregoing reasons, it is respectfully submitted that the application is in condition for allowance and such action is earnestly solicited.

Respectfully submitted,

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